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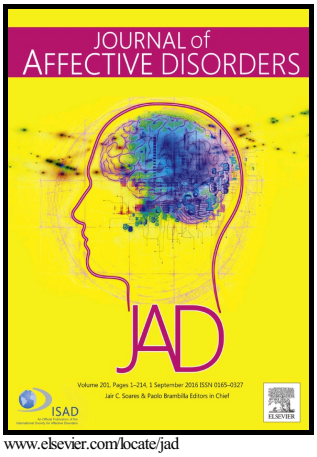

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The prevalence and correlates of self-harm ideation trajectories in Australian women from pregnancy to 4-years postpartum

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Abstract

Objectives

Women in the perinatal period are at increased risk of experiencing self-harm ideation. The current study longitudinally examines the prevalence, trajectories, and correlates of self-harm ideation in a population-based sample of Australian women from pregnancy through to the early years of parenting.

Methods

Drawing on data from 1,507 women participating in a prospective pregnancy cohort study, data were collected during pregnancy, at 3-, 6-, 12-, and 18-months postpartum, and 4-years postpartum. Longitudinal Latent Class Analysis was conducted to identify groups of women based on their responses to thoughts of self-harm at each time-point. Logistic regression analysis was used to identify factors associated with group membership.

Results

Approximately 4-5% of women reported experiencing self-harm ideation at each time-point from pregnancy to 4-years postpartum. Cross-sectional analyses revealed that self-harm ideation was most frequently endorsed in the first 12-months postpartum (4.6%), and approximately 15% of women reported self-harm ideation at least once during the study period. Longitudinally, approximately 7% of women had an enduring pattern of self-harm ideation from pregnancy to 4-years postpartum. Women who had experienced a range of preconception and current social health issues and disadvantage were at increased risk of self-harm ideation over time.

Limitations

included brief and limited measures, along with an underrepresentation of participants with particular socio-demographic characteristics.

Conclusions

A proportion of women are at increased risk of experiencing self-harm ideation during the perinatal period and in the early years of parenting, underscoring the need for early identification during pregnancy and early postpartum to facilitate timely early intervention.

Keywords

prospective cohort study; pregnancy; postnatal; self-harm ideation

Introduction

There is increasing evidence that women in the perinatal period (conception to 12 months postpartum) are more likely to endorse self-harm and/or suicidal ideation than women in the general population (Gelaye et al., 2016). Self-harm ideation refers specifically to thoughts about intentionally harming oneself, with or without the intent of dying (Pope et al., 2013), whilst suicidal ideation refers to specific thoughts and images of, as well as preparations for, ending one's life. Both can have serious implications for women and children including the impact of high stress and cortisol levels in utero on fetal development (Evans et al., 2001), increased risk of low birthweight (Taylor et al., 2016), perinatal loss (Kurinczuk et al., 2014), and less positive affect among infants (Paris et al., 2009). Given these potential adverse outcomes, identifying women reporting self-harm and suicidal ideation warrants attention. The current paper focuses specifically on *self-harm ideation* as a significant body of research has shown that it is one of the strongest predictors of death due to suicide in the general population (Cooper et al., 2005; Hawton et al., 2003; Owens et al., 2002; Plener et al., 2015). Self-harm ideation is a key target for maternal suicide and self-harm prevention efforts.

In our review of the literature, we draw upon research into the prevalence and correlates of both self-harm and suicidal ideation in the perinatal period. This is in part due to the lack of research into self-harm ideation specifically, as well as how the terms have been used interchangeably in the literature given that they are very distinct sets of thoughts. A recent systematic review of 57 studies identified that prevalence estimates for maternal suicidal ideation during pregnancy vary widely between 3% and 33% (Gelaye et al., 2016). The considerable variability is likely due to differences in the definitions and assessment measures of suicidal and

self-harm ideation used, the timing of assessments, and variation in sample characteristics and study designs.

Studies conducted with clinical samples have reported the highest estimates of self-harm and suicidal ideation. For instance, in a convenience sample of 147 pregnant women with major depression or bipolar disorder in Canada, 17% and 6% reported self-harm and suicidal ideation, respectively (Pope et al., 2013). In another study of 383 pregnant women attending a US clinic specialising in the treatment of perinatal neuropsychiatric illnesses, 33% endorsed suicidal ideation on the Beck Depression Inventory or the Hamilton Depression Rating Scale (Newport et al., 2007). More recently, in a larger sample of 628 women with depression at 4-6 weeks postpartum recruited from a US obstetrics hospital, 21% endorsed self-harm ideation on item 10 ("The thought of harming myself has occurred to me") of the Edinburgh Postnatal Depression Scale (EPDS; Sit et al., 2015). Although these estimates have clinical utility and indicate considerable psychiatric comorbidity, it is important to examine the prevalence of self-harm ideation among both psychiatric and non-psychiatric populations as thoughts of self-harm can also be experienced in the absence of serious mental health problems (Toprak et al., 2011). Furthermore, not all women experiencing mental health problems disclose symptoms or seek help given significant stigma associated with mental illness.

Estimates from population-based samples are considerably lower than those based on clinical samples, ranging from 2 to 7% (i.e., Bodnar-Deren et al., 2016; Kim et al., 2015; Mauri et al., 2012). In a study of 1,073 mothers attending in a New York City hospital, 2% reported suicidal ideation on the EPDS and the Patient Health Questionnaire in the first 6 months postpartum (Bodnar-Deren et al., 2016). Similar estimates were reported in a study of 13,724 women attending two US hospitals at 24-28 weeks gestation on the EPDS (3.8%) and 6 weeks

postpartum (3.4%) (Kim et al., 2015). Higher estimates have been reported in an Italian study of 1,066 women during pregnancy (6.9%) and postpartum (4.3%) (Mauri et al., 2012). Whilst these studies highlight that a small proportion of women report self-harm ideation, no population-based studies have reported on the extent to which women in Australia report self-harm ideation at multiple time points from pregnancy through to the early years of parenting. In contrast, data reported in this paper come from a prospective study that involved frequent follow-up at 3, 6 and 12 months postpartum and at 4 years. Hence, providing more robust evidence regarding period prevalence, especially for the first 12 months postpartum.

In addition to identifying the extent to which women report self-harm ideation, an improved understanding of the risk factors for different patterns of self-harm ideation over time is warranted. This may help facilitate timely intervention and appropriate referral pathways. In their recent review of 57 studies into suicidal ideation among women during pregnancy, Gelaye et al. (2016) identified several key risk factors including comorbid psychiatric and substance use disorders, intimate partner violence, low educational attainment (i.e., high school or less), childhood physical or sexual abuse, low social support, unplanned pregnancy, being from a non-English speaking background, and multiparity. In another review of 129 studies into suicidal ideation during pregnancy and the postpartum period, Orsolini et al. (2016), risk factors identified included younger maternal age, having a past history of suicidal attempt or ideation, experiencing social or racial discrimination, living in a rural area, crowded or inadequate housing, and prior exposure to disaster, conflict or war. Whilst these risk factors reflect social disadvantage and trauma, the evidence generated to date primarily comes from small clinical samples, and is based on retrospective and cross-sectional studies.

The current study

To address the methodological limitations of previous research, and to improve our understanding of the risk factors for *self-harm ideation* specifically, data were drawn from an Australian prospective pregnancy cohort of over 1,500 first-time mothers and their children from pregnancy to 4-years postpartum. *Self-harm ideation* is defined in this study as thoughts about intentionally harming oneself, with or without the intent of dying (Pope et al., 2013). The aims of this study were to: 1) investigate the extent to which women report self-harm ideation from pregnancy to 4-years postpartum; 2) identify distinct groups of women defined by their trajectories of self-harm ideation across five time-points from early pregnancy to 4-years postpartum; and 3) identify pre-conception and early postnatal factors associated with women's trajectories of self-harm ideation.

Methods

Study design and sample

Data were drawn from the Maternal Health Study, a prospective pregnancy cohort study of 1,507 nulliparous women in Australia. Detailed information about the study design, sampling and field methods are published in the study protocol (Brown et al., 2006), and ethics approval was granted from the ethics committees of participating hospitals, La Trobe University, and the Royal Children's Hospital, Melbourne. Briefly, women registered to give birth at six public hospitals in Melbourne, Australia were recruited between 1 April 2003 and 31 December 2005. Eligibility criteria for participation included: (a) pregnant with an estimated gestation of <24 weeks; (b) nulliparous; (c) sufficient fluency in English to complete written questionnaires and telephone interviews; and (d) aged 18 years or older.

Approximately 6,000 invitations to participate were distributed to women during clinic visits, antenatal education classes, and mailed to women at their home address. It is not possible to determine precisely how many: (a) women received more than one invitation; (b) ineligible women received an invitation (e.g. miscarriage after booking, not nulliparous); or (c) invitations were incorrectly addressed. A total of 1,507 women met the eligibility criteria and returned a baseline questionnaire. Assuming that 80–90% of invitations reached eligible women, we conservatively estimate that the final response rate was approximately 28-31%.

Women completed questionnaires in early pregnancy (10–24 weeks' gestation), at 3-, 6-, 12-, and 18-months postpartum, and 4-years postpartum. Retention rates at the follow up time points range from 95% (late pregnancy) to 83% of the 1,354 women who consented to the extended follow-up at four years postpartum. Selective attrition was observed between 6-months and 4-years, whereby women who did not complete the 4-year follow-up were more likely to be younger, born overseas and more likely to report depressive symptoms in the first year following birth.

Measures

Self-harm ideation

Self-harm ideation was assessed during pregnancy and at 3-, 6-, 12- and 18-months, and 4-years postpartum using a single item from the Edinburgh Postnatal Depression Scale (EPDS; Cox et al., 1987). The EPDS is 10-item self-report measure that assesses the extent to which women experience depressive symptoms in the past week on a 4-point scale during pregnancy and the postnatal period. Response options for Item 10 - "The thought of harming myself has occurred to me" include "Yes, quite often", "Sometimes", "Hardly ever" or "Never". Self-harm ideation was defined as endorsement of any of the following response options: "Yes, quite often", "Sometimes", "Hardly ever".

Potential predictors of self-harm ideation trajectories

A range of socio-demographic, preconception, antenatal and early postnatal factors potentially associated with trajectories of self-harm ideation over time were assessed as listed below.

Socio-demographic factors

Demographic information was collected at enrolment during pregnancy and included maternal age (≥25 years; ≤24 years), relationship status (partnered; not partnered), country of birth (Australia; English speaking country; non-English speaking country), employment status (in paid employment; not in paid employment), personal income per annum ($AUD); highest educational attainment (post-high school qualification; high school [Yr12 or less]); and number of children at 4 years postpartum (1 child; 2 or more).

Preconception factors

Women were asked whether they had ever experienced physical or sexual abuse during childhood (no; yes) using the Child Maltreatment History Self Report at 4-years postpartum (MacMillan et al., 2013). Women were also asked if they had ever been afraid of a partner (no; yes) and if they had experienced depressive or anxiety symptoms 12-months prior to the current pregnancy (never/rarely; occasionally/often).

Antenatal factors

During pregnancy, women were asked if they experienced fear of their current or former partner (no; yes). Depressive symptoms were assessed during pregnancy using the EPDS (Cox et al., 1987). For the purpose of the current study, the self-harm item (see above) was excluded from the total scale score.

Postnatal factors

At 3-months postpartum, women were asked whether they experienced any of the following health problems since birth: urinary incontinence, fecal incontinence, lower back pain, upper back pain, and painful or sore perineum (none; 1-2; 3 or more). At 12-months postpartum, women were asked if they would have liked more emotional support (e.g., someone to talk to about how they are feeling) over the last month (No, not really; Yes, definitely). The modified EPDS was also used to assess depressive symptoms at 3-months postpartum (as above).

The short version of the Composite Abuse Scale (Hegarty et al., 2005) was used to assess whether women had experienced intimate partner violence in the last 12 months after birth. Consisting of 18 items, women reported how often actions by an intimate partner that constitute emotional (e.g., ‘Shook me’; ‘Slapped me’) or physical abuse (e.g., ‘Told me I wasn’t good enough’) occurred (‘never’, ‘only once’, ‘several times’, ‘once per week’ or ‘daily’) in the last 12 months. Scores of >3 for emotional items are indicative of emotional abuse, and scores >1 for

physical items are indicative of physical abuse. Any abuse was coded as 1=Yes, and no abuse as 0= No.

Data analysis

Descriptive statistics for the sample demographics and study variables, as well as reliability estimates, were computed using SPSS (IBM SPSS Statistics, 2016). Latent Class Analysis (LCA) was then conducted to identify groups of women based on their responses on the thoughts of self-harm item (0 = never; 1= a response of "Yes, quite often", "Sometimes", "Hardly ever" or "Never") on the EPDS during pregnancy at 3-, 6-, 12- and 18-months postpartum, and 4-years postpartum using MPlus Version 7.11 (Muthen and Muthen, 1998-2011). This involved identifying the smallest number of classes starting with a parsimonious 1-class model and fitting successive models with increasing numbers of classes. Model solutions were compared using the Likelihood ratio statistic (L^2), Bayesian Information Criterion (BIC), and Akaike Information Criterion (AIC) across the successive models. Better fitting models have lower L^2, BIC, and AIC values. Entropy is an index for assessing the precision of assigning latent class membership, with higher probability values indicating greater precision of classification. Posterior probabilities are also obtained for each case indicating the probability of belonging to each class. The Vuong-Lo-Mendall-Rubin likelihood ratio test was also used to test for significant differences between the models. The class membership of all women in the sample was recorded and used in the logistic regression analyses to identify factors associated with the identified latent classes. Univariate and multivariable logistic regression models were estimated in SPSS. Results are presented as odd ratios (OR) with 95% confidence intervals (CI).

Missing data for the self-harm item were handled using Full Information Maximum Likelihood when conducting the latent class analysis in Mplus, and missing data for the study

variables used in the regression models were managed using multiple imputation. Twenty complete datasets were imputed using a multivariate normal model incorporating all variables used in the analyses. We obtained pooled estimates for all proportions and model parameter estimates were generated by SPSS. All analyses were conducted using cases with complete data only, as well as the total sample with imputed data. Given that the analyses yielded similar results, only those using imputed data are presented here.

Results

Sample characteristics

A total of 1,507 women participated in the study. Their demographic characteristics at enrolment, and those of nulliparous women giving birth in Victoria as public patients during the study recruitment period, are presented in Table 1. The majority of women enrolled in the study were born in Australia, aged between 25 and 34 years, married or living with a partner, tertiary educated and in paid employment during pregnancy.

Descriptive statistics

On average, the extent of missing data for all study variables was approximately 9.7%. Proportions of missing data were highest for variables measured at 4-years postpartum (27%). Table 2 indicates that the proportion of women reporting thoughts of self-harm (a response of "Yes, quite often", "Sometimes", "Hardly ever" or "Never" to item 10 of the EPDS) from pregnancy to 4-years postpartum was fairly consistent at 4-5% over time. The proportion of women reporting thoughts of self-harm was highest in the first 12-months only. The proportion of women reporting thoughts of self-harm at any time point during the study was 14.7% (n=150).

Latent class analysis to identify trajectories of women's self-harm ideation over time

Latent class models specifying 1-5 models were estimated and are presented in Table 3. Although the model fit indexes (L^2, AIC, BIC) continued to decrease as class size increased, the 2-class model was accepted as the final model. The Vuong-Lo-Mendell-Rubin likelihood ratio test indicated a significant difference between the 1- and 2-class models, suggesting that the 2-class model gives significant improvement in fit over the 1-class model. There were no significant differences between the 2- and 3-class models or 3- and 4-class models. The entropy value was highest for the 2-class model, and the classification probabilities for latent class membership were high (Class 1: 0.91; Class 2: 0.97), suggesting acceptable precision in assigning individual cases to their appropriate class.

Table 4 reports on the probability of women in the two classes reporting self-harm ideation at each time point. Class 1 was the smallest class (n=105, 7%) with women who had 38-43% probability of endorsing self-harm ideation across each of the time points, whilst women in class 2 (n=1,402, 93%) had a 1-3% probability of endorsing self-harm ideation across each of the time points. Class 1 was referred to as the 'Persistent Self-harm Ideation' class and Class 2 was referred to as the 'Minimal Self-harm ideation' class.

Predictors of the 'Persistent Self-harm Ideation' latent class

Table 5 presents univariable and multivariable analyses assessing the relationships between potential predictor variables of the 'Persistent Self-harm Ideation' class. Univariable analyses revealed that women represented by the 'Persistent Self-harm Ideation' latent class were more likely to: (a) be aged <25 years when they had their first child; (b) not be partnered; (c) have

migrated from a non-English speaking country; (d) not be in paid employment; and (e) have an educational attainment of high school or less. The preconception factors (prior to the index pregnancy) associated with the 'Persistent Self-harm Ideation' class were having history of childhood physical and/or sexual abuse, having been afraid of an intimate partner, and having a past history of depressive and/or anxiety symptoms. Depressive symptoms during pregnancy and in the early postpartum were associated with the 'Persistent Self-harm Ideation' class, as was fear of a partner during pregnancy and intimate partner abuse in the early postpartum. Three or more physical health problems and a high perceived need for support were associated with membership in the 'Persistent Self-harm Ideation' class. Finally, having more than one child four years after the birth of the index child was associated with lower odds of being in the 'Persistent Self-harm Ideation' class.

The multivariable model revealed that the strongest predictors of membership in the 'Persistent Self-harm Ideation' class were not being in paid employment, having a high perceived need for social support, having a past history of childhood physical abuse, and depressive symptoms during pregnancy and the early postpartum.

Discussion

Of the 1,507 first-time mothers participating in the Maternal Health Study, approximately 4-5% reported experiencing *self-harm ideation* in the week prior to each follow-up time-point from pregnancy to 4-years postpartum. Self-harm ideation was most frequently endorsed in the first 12-months postpartum (4.6%), and approximately 15% of women reported self-harm ideation at least once from pregnancy to 4-years postpartum. This is consistent with other studies reporting on self-harm ideation among women with major depression or bipolar disorder during

pregnancy (17%; Pope et al., 2013) and among women with depression in the early postpartum (21%; Sit et al., 2015). It is also consistent with 4% reported in another population based study of over 4,000 mothers in the postpartum (Howard et al., 2011). These findings highlight how frequently endorsed self-harm ideation is among women during the perinatal period and in the early years of parenting.

Drawing upon data from multiple assessments over the course of the study period, longitudinal latent class analyses revealed that approximately 7% of women had an enduring pattern of self-harm ideation from pregnancy to 4-years postpartum. Women assigned to this latent class had a higher probability of endorsing self-harm ideation than the remaining sample. This is of significant concern given the chronicity of distress likely experienced by these women, and that self-harm ideation is a strong risk factor for death by suicide (Cooper et al., 2005; Hawton et al., 2003; Owens et al., 2002; Plener et al., 2015). These findings underscore the need for early identification during pregnancy and the early postpartum to facilitate timely early intervention.

Several antenatal and early postnatal risk factors associated with a persistent pattern of self-harm ideation from pregnancy to 4-years postpartum were identified. Women were more likely to endorse persistent self-harm ideation if they: (a) experienced depressive symptoms during pregnancy and the early postpartum; (b) were not in paid employment during pregnancy; (c) lacked social support in the first year postpartum; and (d) had a childhood history of physical abuse. Univariate analyses suggest that the following factors were also associated with persistent self-harm ideation: (a) under 25 years at the time of pregnancy with first baby; (b) high school education or less; (c) migration from a non-English speaking country; (d) not partnered during pregnancy; (e) a history of childhood sexual abuse; (f) preconception mental health difficulties;

(g) postpartum physical health problems; and (h) intimate partner abuse. These findings are consistent with research showing that suicidal ideation is high (25-37%) among mothers who have experienced childhood maltreatment and have a long history of mental health difficulties (Muzik et al., 2016). Taken together, these findings reflect preconception and current social health issues and disadvantage that may serve to increase women's vulnerability to self-harm ideation over time.

Study strengths and limitations

This study extends previous research focussed on identifying predictors of self-harm at single time points during the perinatal period (Howard et al., 2011; Kim et al., 2015). The extensive follow-up of women from pregnancy to 4-years postpartum enabled us to conduct longitudinal analyses to examine patterns of self-harm ideation over time. The inclusion of validated measures of intimate partner abuse, as well as preconception history of childhood abuse and mental health symptoms, are also key strengths of this study.

Nonetheless, there are several limitations to note. First, the low recruitment fraction and differential attrition across the study period are key issues to be considered. Although we do expect that the low recruitment fraction is offset to some expected by the relatively low attrition, we acknowledge that generalisation of the findings to women underrepresented in the study is limited. This includes women under 25 years of age, those with an educational attainment of high school or less, unpartnered women, and those who had migrated from a non-English speaking country. These women are more likely to experience economic disadvantage as well as social and mental health problems; therefore, our study may underestimate the prevalence of self-harm ideation and persistence over time. Whilst we would expect selection bias to affect

prevalence estimates, there is some evidence that estimates of association are not likely to be affected (Mealing et al., 2010).

Second, there are limitations pertaining to the measures used in this study. Brief self-report measures were used to assess self-harm ideation, fear of a partner, and perceived need for social support. Although widely used by health professionals, a single item from the EPDS was used to identify women who endorsed self-harm ideation in the past week. This does not provide information about the nature of the self-harm thoughts and intentionality to act on these thoughts, and how they relate to suicidal ideation and death by suicide in the perinatal period. It is possible that women may misinterpret this as being fearful of accidental harm (Kim et al., 2015) and this issue has previously been identified for Vietnamese women who had migrated to Australia (Small et al., 2003). Also, retrospective reports of preconception mental health were obtained, introducing the potential for recall bias. Together, these may have led to an underestimation of the strength of the relationships between some variables and class membership for self-harm ideation.

Finally, whilst we sought to identify a range of demographic and psychosocial factors associated with self-harm ideation, a number of other factors that were not included in the current study are worthy of investigation. These include history of self-harm ideation and behaviour, psychiatric illness, personality traits, couple relationship difficulties, substance use issues, and partner mental health difficulties.

Implications and Conclusions

Our study findings have important implications for health professionals providing care to women during pregnancy and across the postnatal period. Screening for depression and other health issues primarily occurs during pregnancy and in the early postpartum (beyondblue, 2010;

Department of Education and Early Childhood Development, 2009; National Institute for Health and Clinical Excellence, 2007). Yet our findings show that approximately 15% of women reported self-harm ideation at least once from pregnancy to 4-years postpartum, and that 7% reported persistent self-harm ideation across this time. These findings underscore the importance of a thorough psychosocial assessment not only during pregnancy and the early postpartum, but well into the early years of parenting to identify and support women at risk of self-harm ideation, mental and social health concerns. The EPDS is a commonly used screening and assessment tool by health professionals, providing an opportunity to identify women experiencing thoughts of self-harm. Endorsement of the item on self-harm ideation should form the basis for further inquiry and thorough psychosocial risk assessment. Specifically, this assessment should focus on understanding the nature of women's self-harm thoughts, intention to act on the thoughts, plans or methods to engage in self-harm, if there is a past history of self-harm thoughts and behaviour, and if they are also experiencing suicidal ideation. Additionally, health care professionals should be provided with adequate training in supporting women who experience self-harm ideation as 58% of health care professionals report that they do not feel confident in working with self-harm (Gibb et al., 2010).

Identifying the antecedents or triggers for self-harm ideation, and understanding the predisposing contextual risk factors and protective factors are also important elements of a psychosocial risk assessment. Our study revealed that there are variations in reports of self-harm ideation among women which might reflect differences in their preconception and current circumstances. For instance, the correlates for persistent patterns of self-harm ideation reflect a history of social disadvantage, mental health difficulties and trauma. Many risk factors such as depressive symptoms, lack of social support, physical health problems, intimate partner abuse

and exposure to childhood physical abuse, can be identified by health professionals during early pregnancy. Early identification can facilitate referral pathways for treatment during early pregnancy. Intervention efforts that address women's experience of self-harm ideation and are tailored to their preconception history and social contexts during early pregnancy are critical. This is a time when attention to the potential sequelae of these experiences is of utmost importance for safeguarding the health and wellbeing of women, and their children and partners.

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Author Statement

This manuscript has been solely submitted to this journal. It has not been published previously, in press, or elsewhere and therefore meet our obligation in relation to copyright.

Contributors

All authors have contributed significantly and are in agreement with the content of the manuscript. RG, PP and MS drafted the manuscript, RG conducted statistical analysis. RB, MD and SB contributed to the interpretation of findings and all authors contributed to the conceptualization of the paper. The authors have no conflicts of interest to declare.

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Table 1. *Characteristics of study participants at enrolment and nulliparous women giving birth in Victoria as public patients during the study recruitment period*

Characteristics	Study Participants *N*=1,507 *n* (%)	Victorian Public Patients *N*=40,905 *n* (%)
Mean gestation at enrolment	15 weeks (SD=3.1) Range: 6-24 weeks	
Maternal age at enrolment		
18-24 yrs	190 (12.6%)	12,216 (29.9)
25-29 yrs	417 (27.3%)	13,802 (33.7)
30-34 yrs	563 (37.4%)	10,740 (26.3)
35-39 yrs	225 (14.9%)	3,552 (8.7)
40-46 yrs	41 (2.7%)	585 (1.5)
Not reported	76 (5.0%)	
Country of birth		
Australia	1074 (71.3%)	29,791 (73.3)
Overseas – English speaking background	138 (9.7%)	2,330 (5.7)
Overseas – Non-English speaking background	212 (14.1%)	8517 (21.0)
Not reported	83 (5.5%)	
Relationship status at enrolment		
Married	876 (58.1%)	22,790 (55.9)
Living with partner	490 (32.5%)	
Divorced/separated/single	65 (4.3%)	
Not reported	76 (5.0%)	
Highest completed qualification at enrolment		
Post-high school qualification	387 (25.7%)	n/a
High school (Yr12) or less	1036 (68.7%)	
Not reported	84 (5.6%)	
Employment status in pregnancy		
Paid employment	1172 (77.8%)	
Not in paid employment	234 (15.5%)	n/a
Not reported	101 (6.7%)	
Personal Income (AUD$)		
≥$60,000 pa	188 (12.5%)	
$40,001-60,000 pa	419 (27.8%)	
$20,001-40,000 pa	494 (32.8%)	n/a
≤$20,000 pa	215 (14.3%)	
Not reported	191 (12.7%)	

Table 2. *Proportions of women reporting self-harm ideation from pregnancy to four years postpartum*

	n	%	95% CI
Each time point			
Pregnancy	75	5.0	3.9-6.1
3 months postpartum	62	4.4	3.4-5.3
6 months postpartum	70	4.6	4.0-6.2
12 months postpartum	65	4.8	3.7-6.0
18 months postpartum	60	4.5	3.4-5.6
4 years postpartum	59	5.4	4.0-6.9
Different time points			
Pregnancy only	12	1.2	0.5-1.9
First 12-months postpartum only	47	4.6	3.3-5.9
Pregnancy and first 12-months postpartum	5	0.5	0.1-1.0
From 3-months to 4-years postpartum	16	1.6	0.9-2.4
18-months postpartum only	17	1.7	0.9-2.5
4-years postpartum only	25	2.5	1.6-3.4
Mixed (pregnancy, postnatal and beyond)	28	2.7	1.8-3.8
No self-harm at any time point	869	85.3	83.1-87.5

Cases missing at least one data point (n=488; 32.4%)

Table 3. *Model fit indices for latent class models for self-harm ideation from pregnancy to 4 years postpartum*

Model	L^2	BIC	AIC	Entropy	Vuong-Lo-Mendell-Rubin p-value	
1-class	-1564.80	3173.50	3141.59	-	-	-
2-class	-1367.56	2830.24	2761.12	.86	1 vs. 2 classes	<.0001
3-class	-1363.67	2873.68	2767.33	.83	2 vs. 3 classes	.867
4-class	1361.46	2920.48	2776.92	.76	3 vs. 4 classes	.505

Note: L^2= Likelihood-ratio statistic, BIC= Bayesian Information Criterion, AIC= Akaike Information Criterion

Table 4. *Probabilities of endorsing self-harm ideation at each time point for each latent class*

	Class 1 'Persistent Self-harm Ideation' (n=105)	Class 2 'Minimal Self-harm Ideation' (n=1402)
Pregnancy	0.43	0.01
3 months postpartum	0.38	0.01
6 months postpartum	0.41	0.02
12 months postpartum	0.43	0.02
18 months postpartum	0.38	0.02
4 years postpartum	0.40	0.03

Table 5. *Logistic regression analyses for the bivariate and multivariable associations between potential predictor variables and the 'Persistent Self-harm Ideation' latent class*

Outcomes	Class 1 'Persistent Self-harm Ideation' (*n*=105) *n* (%)	Class 2 'Minimal self-harm ideation' (*n*=1402) *n* (%)	Univariate[a] OR (95% CI), p	Multivariate[a] OR (95% CI), p
Socio-demographic factors				
Maternal age at birth of first child				
≥25 years	79 (75.2%)	1225 (87.4%)	Ref.	Ref.
<25 years	26 (24.8%)	177 (12.6%)	**2.31 (1.41-3.80), <.001**	0.98 (0.51, 1.89), .951
Relationship status during pregnancy				
Partnered	92 (87.6%)	1346 (96.0%)	Ref.	Ref.
Not partnered	13 (12.4%)	56 (4.0%)	**3.54 (1.84, 6.81), <.001**	1.32 (0.55, 3.16), .530
Country of birth				
Australia	71 (67.6%)	1064 (75.9%)	Ref.	Ref.
English speaking country	6 (5.7%)	140 (10.0%)	0.60 (0.24, 1.51), .280	0.80 (0.28, 2.27), .675
Non-English speaking country	28 (26.7%)	198 (14.1%)	**2.07 (1.28, 3.36), .003**	1.63 (0.85, 3.14), .140
Employment				
In paid employment	59 (56.2%)	1195 (85.2%)	Ref.	Ref.
Not in paid employment	46 (43.8%)	207 (14.8%)	**4.49 (2.90, 6.97), <.001**	**2.06 (1.17, 3.61), .012**
Personal income per annum (AUD$)				
≥$60,000	5 (4.8%)	203 (14.5%)	Ref.	-

Outcomes	Class 1 'Persistent Self-harm Ideation' (*n*=105) *n* (%)	Class 2 'Minimal self-harm ideation' (*n*=1402) *n* (%)	Univariate[a] OR (95% CI), p	Multivariate[a] OR (95% CI), p
$40,001-60,000	21 (20.0%)	440 (31.4%)	2.01 (0.65, 6.23), .225	-
$20,001-40,000	35 (33.3%)	528 (37.7%)	2.76 (0.88, 8.62), .081	-
≤$20,000	44 (41.9%)	231 (16.5%)	**8.10 (2.70, 24.29), <.001**	-
Highest educational attainment				
Post-high school qualification	66	1030	Ref.	Ref.
High school (Yr12) or less	39	372	**1.65 (1.06, 2.57), .027**	1.09 (0.62, 1.91), .773
Number of children at 4yrs postpartum				
1	50	374	Ref.	Ref.
2 or more	55	1028	**0.40 (0.24, 0.66), <.001**	0.80 (0.43, 1.50), .487
Preconception factors (prior to index pregnancy)				
Childhood history of physical abuse				
No	49	1041	Ref.	Ref.
Yes	56	360	**3.36 (1.96, 5.77), <.001**	**1.93 (1.07, 3.51), .030**
Childhood history of sexual abuse				
No	68	1093	Ref.	Ref.
Yes	37	309	**1.88 (1.05, 3.37), .033**	1.15 (0.58, 2.26), .695
Afraid of an intimate partner				
No	69	1154	Ref.	Ref.
Yes	36	248	**2.43 (1.59, 3.73), <.001**	0.89 (0.47, 1.69), .726
Depressive and/or anxiety symptoms				
Never – Rarely	57	1179	Ref.	Ref.

Outcomes	Class 1 'Persistent Self-harm Ideation' (*n*=105) *n* (%)	Class 2 'Minimal self-harm ideation' (*n*=1402) *n* (%)	Univariate[a] OR (95% CI), p	Multivariate[a] OR (95% CI), p
Occasionally – Often	48	223	**4.46 (2.96, 6.72), <.001**	1.27 (0.73, 2.21), .408
Antenatal Factors (early pregnancy)				
Depressive symptoms (modified EPDS)	10.87	4.67	**1.23 (1.19, 1.28), <.001**	**1.12 (1.07, 1.18), <.001**
Afraid of a partner				
No	93	1363	Ref.	Ref.
Yes	12	39	**4.58 (2.27, 9.22), <.001**	1.44 (0.52, 3.99), .487
Postnatal factors				
Depressive symptoms (modified EPDS) (3mths pp)	10.22	4.39	**1.26 (1.21, 1.31), <.001**	**1.16 (1.10, 1.22), <.001**
Physical health problems (3mths pp)				
None	16	353	Ref.	Ref.
1-2	71	831	1.78 (0.85, 3.70), .124	0.90 (0.38, 2.16), .820
3+	18	218	**1.83 (1.04, 3.24), .037**	1.38 (0.72, 2.66), .330
Intimate Partner Abuse (12mths pp)				
No	61	1160	Ref.	Ref.
Yes	44	242	**3.42 (1.95, 6.00), <.001**	1.06 (0.53, 2.13), .873
Perceived need for support (12mths pp)	79	577	**4.37 (2.63, 7.25), <.001**	**1.97 (1.12, 3.46), .020**

[a] Minimal symptoms is the reference group.

Highlights

- Self-harm ideation common during perinatal and early parenting periods.
- Self-harm ideation can be enduring from pregnancy to 4-years postpartum.
- Social health issues and disadvantage increase risk of self-harm ideation over time.
- Need for psychosocial risk assessment to continue through early years of parenting.